

INTERAGENCY AGREEMENT  
DTFAO1-96-Z-02035  
BETWEEN  
FEDERAL AVIATION ADMINISTRATION  
AND  
THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
AERONAUTICAL SAFETY AND HUMAN FACTORS

I. The purpose of this modification 001 to the referenced agreement is to add FY 1997 funding in the amount of \$ 1.270M for the tasks specified in item II below to be accomplished in FY 1997, and to make other administrative changes.

II. The following tasks are for FY 1997 execution:

Task 1: Automated Performance Measuring System (APMS). NASA shall accomplish the following:

A. Deliverable Product 1-1: APMS Prototypes to Several US Air Carriers.

Conduct user-needs studies with United, and prepare a user-need report. Recommend to the APMS team a response to each new partner as basis for design of initial builds. Establish detailed procedures for accessing and handling data from United. Access data, and enter them into the APMS database at Alaska and United Airlines. Implement a developmental database system such as ORACLE suitable for use by individual airline partners which will support the continued development of APMS functions. Based on experience with ORACLE, establish guidelines for company-level systems. Develop the concept of total system integration, and provide user friendly interface for rapid and transparent data access. Develop a compatible database system that will accommodate very large quantities of flight data capable of supporting future merging of multiple airline databases. Achieve the 3rd Build at Alaska Airlines and 1st or 2nd Build at United Airlines.

B. Deliverable Product 1-2: Automated Analysis for Assessing Exceedences or Special Events.

Make use of newly-acquired flight data to further develop prototypes of knowledge-based software tools with user-friendly interface that will assist the analyst in: (1) validating candidate exceedences identified by COTS software; (2)

positing possible explanatory factors; (3) assessing event severity; (4) identifying similar past events in the database; (5) flagging like events in the future. Demonstrate to each of the partners a very sophisticated level of automated analysis. Initiate an implementation of the concepts into GRAF in collaboration with FDC.

#### C. Deliverable Product 1-3: Animated Flight Data.

Define level of fidelity required for crew feedback and for assisting analysts. Work with key industry elements to encourage development of required capability at minimum cost for PC-based animation. Develop software and user-friendly interface to access any selected flight or flight segment in the database for animated display. Initiate development of an animated view of crew activities on the animated flight deck based on developments from MIDAS. Start with the collaboration under way with United Airlines, Coryphaeus, and MIDAS as the first step toward a practical implementation that any airline can afford. Extend the capability as far as possible, even to simulating ramp accidents.

#### D. Deliverable Product 1-4: Operationally-oriented Statistical Analyses and Presentation System Prototype.

Identify, develop, and test statistical sampling, aggregation, and compression designs to minimize storage and processing requirements without compromising trend analysis or retrospective search for data. Develop a suite of descriptive statistics for operationally meaningful overview of operations. Develop the software to generate the desired statistics and supporting graphics, and equip with user-friendly interface. test in response to user-needs of partners. Continue the work started in FY 1996 with Alaska Airlines. Continue development of tools to enable trend analyses, and establishment of sampling requirements. Pursue with all four partners.

#### E. Deliverable product 1-5: Prototype for intra-company sharing of AMPS information and for linking with the databases within a company.

Explore potential of, and approach to, linking flight data with other information such as incident reports and other databases. Initially, this will be aimed at linking APMS databases with other existing databases within a single company. Eventually, this work will address the tools and methodologies needed to link with NASDAC, and the applicability of SPIRE to one or more NASDAC-like databases.

Provide advice and assistance to airline partners on developing the infrastructure for sharing APMS tools and data within the company. Start with all partners, knowing the extent to which it can be implemented within each airline will vary with both its size and its current infrastructure.

F. Deliverable Product 1-6: APMS Prototype Adapted to AQP Simulation Training.

Provide tools and methodologies that will enable comparisons of performance during simulations training to actual flight operations. This will be among the APMS capabilities, and will be identified as a separate entity for visibility.

G. Deliverable Product 1-7: Automated Analyses for Assessing Engine Health

Form a team of airline operations, flight recorder, APMS, and Code 1C/EHM experts to study the state-of-the-art, the needs of the users, and the risk/reward potential for advanced automation. Initiate the development of knowledge-based systems to enhance current analysis of the engine health systems.

H. Deliverable Product 1-8: Support International MOUs.

Provide advice and consultation, as required, as required, in accordance with agreements, to assist international agencies in the implementation and evaluation of APMS tools and methodologies.

Task 2: No additional funding in FY97

Task 3: Air-Ground Communication and Data Link Interface Design. NASA shall accomplish the following:

Deliverable Product 3-1: Examine flight deck data from a data link full mission investigation with the intent of exploring flight deck procedures for data link message handling. Procedures investigated will include crew variables related to message read aloud, message data entry, message response, downlink, and review message handling. Examine the effects of crew procedures on communication errors and timing in a full mission environment. Produce a definition of flight crew procedures for data link ATC messages. Produce guidelines for procedures leading to enhanced error detection and error avoidance. Produce

recommendations for procedures applicable to data link in a free flight environment.

Task 4: Team Decision-making; Crew Communication; Crew Training Evaluation.  
NASA shall accomplish the following:

- A. Deliverable Product 4-1: Evaluation and debriefing tools for situational awareness/Decision-making in LOS/LOFT.
- B. Deliverable Product 4-2: Guidelines for challenging - “How to Tell Your Crewmember He is Wrong”.
- C. Deliverable Product 4-3: Training guidelines - “Overcoming Ambiguity and Conflict in Decision-making”.
- D. Deliverable Product 4-4: Procedures Guidelines Workshop; Guidelines Document; Technical Report on Checklist Standardization
- E. Deliverable Product 4-5: Technical Reports -
  - LOFT Debriefings: An Analysis of Instructor Techniques and Crew Participation
  - Facilitating LOS Debriefings: A Training Manual

Task 5: No additional funding in FY97

Task 6: No additional funding in FY97

Task 7 : Added for FY97: Information Flow and Collaborative Decision-making in the Air Traffic Management System

There have been numerous instances reported which involve mismatches between expectations or desires of the ATM System and performances of the airlines. The results have ranged from a one-time occurrence to a larger but still localized impact to a system-wide disturbance. There can be a variety of causes: inadequate information exchange or a mutual misunderstanding between ATM and airline AOC; a “loophole” in FAA regulations or procedures; decision-making based on perspectives that are too localized without realizing that more global consequences could result.

A. Deliverable Product 7-1: Identify and model the factors contributing to the occurrence of such problematic situations.

B. Deliverable Product 7-2: Develop generalizations to help predict the circumstances under which such situations could arise in a future ATM system

C. Deliverable Product 7-3: Evaluation of approaches for preventing their occurrence in the future

### III. Under ARTICLE IV - FAA POINTS OF CONTACT

Revise to read as follows:

FAA Contract Administration - The Contract Specialist is Johnette Sullivan, ASU-340, Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591. telephone number is 202-267-8710. The Contracting Officer is Libby Waldman-Strugatch at the same address and phone number.

### III. Under ARTICLE VIII - FUNDING AND PAYMENT

The parties agree that no funding is necessary for Tasks 2,5 and 6, as those tasks were completed in FY 1996 and there is no additional requirement for FY 1997. The parties also agree that funding for Tasks 1,3, and 4 represent the required levels for research to be accomplished in FY 1997. Task 7 is an added requirement to support the ATM IPT.

Task 1 \$600, 000 - W/988.0/G210/8AA/2596/081-110

Task 2 No funding

Task 3 \$220,000 - W/988.0/G210/8AA/2596/081-110

Task 4 \$300,000 - W/988.0/G210/8AA/2596/081-110

Task 5 No funding

Task 6 No funding

Task 7 \$150,000 - W/988.0/G210/8BA/2596/082-110

IV. Except as modified above, all other provisions remain unchanged and in full force and effect.

FEDERAL AVIATION ADMINISTRATION

By: \_\_\_\_\_

Name: Libby Waldman-Strugatch

Title: Contracting Officer

Date:

NATIONAL AERONAUTICS & SPACE ADMINISTRATION

By: \_\_\_\_\_

Name:

Title:

Date: